REMARKS

Claims 1-33 are pending in the application, with claims 2 and 10 amended herein and new claims 30-33 added herein. As described in the remarks below, the rejections of claims 1-9, 22-24, and 25-29 are overcome herein without amendment. Accordingly, the next Examiner's Action must either allow such claims or offer a new ground of rejection. If the next Examiner's Action presents a new ground of rejection, then such Action may not be a final rejection. (MPEP 706.07(a).)

Claims 25-29 stand rejected as being anticipated by Weidman 1993 (Weidman et al., Appl. Phys. Lett., Vol. 62, No. 4, January 25, 1993, p. 372-4). Applicants request reconsideration.

Claim 25 sets forth a semiconductor processing method that includes forming a layer of silanol over a substrate and exposing portions of the layer to energy, the exposing converting the exposed portions to silicon dioxide. After the exposing, the layer is subjected to hydrofluoric acid to selectively remove the silanol of the unexposed portions relative to the silicon dioxide of the exposed portions. Page 2 of the Examiner's Action states that Weidman 1993 shows forming a layer of silanol and converting exposed portions to silicon dioxide by selective exposure to energy. Page 2 also states that Weidman discloses subjecting the layer to hydrofluoric acid. However, thorough review of Weidman reveals that such reference does not disclose any of such claimed features set forth in claim 25.

As is clearly shown in page 373, Table 1 and page 373, column 2, paragraph 1, Weidman 1993 merely describes selective conversion of organosilanes to a material containing silicon, oxygen, and hydrogen having an oxygen to silicon ratio of about 1. That is, a silane rather than silanol is the starting point for the conversion and a silicon/oxygen/hydrogen material is produced rather then silicon dioxide. Silicon dioxide would exhibit an oxygen to silicon ratio of about 2. Nowhere does Weidman 1993 suggest converting silanol to silicon dioxide. Page 372, column 1, paragraph 1 further confirms that silicon dioxide does not result from the photo-oxidation process of Weidman 1993. Such text states that a "SiO_2-like etch mask" is produced. That is, the method of Weidman 1993 does not disclose conversion to SiO_2, but merely discloses conversion to a material having "SiO_2-like" properties. Weidman clearly lacks the advantageous knowledge that silanol can be converted to SiO_2, rather than converting merely to an "SiO_2-like" material.

Page 372, column 1, paragraph 3 of Weidman 1993 describes dry development using chlorine or HBr reactive ion etching (RIE), but nowhere in Weidman 1993 is mention made of hydrofluoric acid to selectively remove a portion of the layer. Anticipation requires that each and every element of a claim be disclosed in a single reference. Weidman 1993 does not disclose selectively converting exposed portions of a silanol layer, does not disclose the result of such conversion as silicon dioxide, and does not disclose selective removal using hydrofluoric acid. Accordingly, Weidman

1993 fails to give any mention whatever to at least three aspects of the method set forth in claim 25. Thus, claim 25 is not anticipated by Weidman 1993.

Claims 26-29 depend from claim 25 and are thus not anticipated by Weidman 1993 at least for the reasons set forth above, as well as for the additional limitations set forth therein not disclosed in the cited art. For example, claim 28 further states that the energy is in the form of an electron beam. Weidman 1993 does not give any mention of an electron beam and only mentions ultraviolet light as an energy source for the photo-oxidation method described therein. Plasma is mentioned in Weidman 1993 but is used solely for deposition processes. Accordingly, Weidman 1993 does not disclose the energy being in the form of an electron beam as set forth in claim 28. Claim 29 further sets forth, among other things, cutting the substrate into separated die while the silicon dioxide of the exposed portions remains over the substrate. Weidman 1993 does not give even a single mention of die cutting. Weidman 1993 further does not give any mention of leaving silicon dioxide converted from silanol on a substrate during die cutting. Rather, Weidman 1993 appears to relate primarily to a etch masks as described on page 372, column 1, paragraph 1. Accordingly, claims 26-29 are further not anticipated by Weidman 1993. Thus, applicants request allowance of claims 25-29 in the Examiner's next action.

Claims 1-9 stand rejected as being unpatentable over Joubert in view of Weidman 1993 and further in view of Weidman 1995 (Weidman et al.,

Journal of Photopolymer Science and Technology, Vol. 8, No. 4, 1995, p. 679-86). Applicants request reconsideration.

Claim 1 sets forth a semiconductor processing method that includes forming a layer of material and exposing some portions of the layer to alter physical properties. Exposed and unexposed portions are subjected to conditions effective to remove either the exposed or unexposed portions faster than the other of the exposed and unexposed portions. After the selective removal, the substrate is cut into separated die. Page 4 of the Examiner's Action admits that Joubert does not disclose or suggest cutting the wafer into separated die. However, page 4-5 states that Weidman 1995, page 681 discloses such wafer cutting. Thorough review of page 681 as well as the remainder of Weidman 1995 and the other references reveals wafer cutting is not mentioned in any manner. Page 681 merely mentions a "wafer processing tools ordinarily used for the dry oxygen plasma stripping," but such does not disclose or suggest in any manner a wafer cutting tool. Further, no mention is given in Weidman 1995 (or the other references) of an altered material remaining over the substrate during wafer cutting. An obviousness rejection based on a combination of references requires that every element of a claim is disclosed or suggested in the cited art. In re Royka, 490 F.2d 981, 180 USPQ 580, 582-3 (CCPA 1974). Since none of the cited references disclose or suggest wafer cutting, claim 1 is patentable over the cited combination.

Claims 2-9 depend from claim 1 and are thus patentable over the cited combination at least for such reason. In addition, claim 8 sets forth that the energy is in the form of an electron beam and claim 9 sets forth that to the energy is in the form of a plasma. As described above, Weidman 1993 is void of any teaching of an electron beam or of selective exposure by plasma to alter physical properties of an exposed portion relative to and unexposed portion. Upon further review, it is clear that both Joubert and Weidman 1995 are equally deficient in this respect. Accordingly, it is impossible that a combination of such references could somehow disclose or suggest the claimed limitation. Thus, it is apparent that page 5-6 of the Examiner's Action stating that Weidman 1993 discloses an electron beam and plasma is in error. Accordingly, claims 8 and 9 are further patentable over the cited combination. Applicants therefore request allowance of claims 1-9 in the Examiner's next action.

Claims 10-21 stand rejected as being unpatentable over Joubert in view of Weidman 1993 and further in view of Weidman 1995. Applicants request reconsideration in light of the amendments herein.

Amended claim 10 sets forth a semiconductor processing method that includes "depositing a layer of material comprising silicon and oxygen as deposited over a substrate" and altering physical properties of the layer selectively exposed to energy. The layer is then subjected to common conditions sufficient to remove either the exposed or unexposed

portions faster than the other of the unexposed and unexposed portions. Each of the cited references are completely void of any teaching of depositing a material comprising silicon and oxygen as deposited and as set forth in claim 10. All of the cited references merely described deposition of silane or organosilanes, which consist solely of silicon, hydrogen, and perhaps carbon. The as deposited silane or organosilanes are then photo-oxidized in an oxygen containing atmosphere which may add oxygen to the prior formed material. However, nowhere do the cited references suggest the advantageous method of depositing a layer comprising silicon and oxygen as deposited.

Further, the cited art does not disclose exposing some portions of a layer comprising silicon and oxygen to energy while leaving other portions unexposed to alter physical properties of the exposed portions, as set forth in claim 10. For example, it is clear from page 680, Fig. 1 of Weidman 1995 that the as deposited layer consists only of silicon, carbon, and hydrogen and the selective ultraviolet light exposure in an oxidizing environment does not expose a layer containing oxygen. Rather, a layer containing oxygen is produced from the photo-oxidation. Subsequently, page 681, paragraph 2 of Weidman 1995 describes dry oxygen plasma stripping to convert photo-oxidatively patterned material to low density oxide. Additional annealing in the presence of oxygen further modifies the oxygen to silicon ratio to about 2.0, approximating silicon dioxide. Notably however, the plasma stripping and annealing of

Weidman 1995 is not done in a selective manner. That is, claim 10 selectively alters physical properties of an oxygen containing layer by exposing some portions and not exposing other portions. By contrast, Weidman 1995 exposes all of the photo-oxidatively converted layer to plasma stripping and annealing. Accordingly, Weidman 1995 does not disclose "exposing some portions of the layer [containing oxygen] to energy while leaving other portions unexposed," as claimed. For at least such reasons, claim 10 is patentable over Joubert in view of Weidman 1993 and further in view of Weidman 1995.

Claims 11-21 depend from claim 10 and are thus patentable at least for such reason as well as for the limitations set forth therein not disclosed or suggested in the cited art. For example, none of the cited references disclose and as deposited silicon-comprising material comprising carbon, silicon, and oxygen, as set forth in claim 11. As set forth in claims 12 and 13, cited art further does not disclose such as deposited material comprising silicon bound to a hydrocarbon group and bound to oxygen. Claims 14 and 15 specified that the as deposited material comprises silanol, which is not disclosed or suggested in the cited art. Claims 16 further specifies exposing the silicon and oxygen comprising layer to energy in the form of ultraviolet light. The cited art merely describes exposing organosilanes with ultraviolet light and does not disclose or suggest exposing material comprising oxygen. Claims 17 and 18 respectively describe the energy in the form of an electron beam and

a plasma. Despite the contrary assertion of page 8 of the Examiner's Action, neither Weidman 1993 nor any other cited art provides even a mention of an electron beam. Further, plasma is used only in deposition processes and not as an energy exposure process to selectively alter physical properties of exposed material. Claims 19 and 20 set forth and as deposited silanol composition exposed selectively to ultraviolet light. As described above, the cited art does not disclose as deposited silanol and further does not disclose exposing silanol to ultraviolet light. Claim 21 sets forth silanol exposed to an electron beam, which is similarly not disclosed or suggested in the art as described above. Accordingly, claims 11-21 are further patentable over Joubert in view of Weidman 1993 and further in view of Weidman 1995 at least for the reasons described above. Applicants request allowance of claims 9-21 in the Examiner's next action.

Claims 22-24 stand rejected as being unpatentable over Weidman 1995 in view of Weidman 1993. Applicants request reconsideration.

Claim 22 sets forth forming a layer of organosilanol and exposing some portions to ultraviolet light, the exposing converting exposed portions to organosilicon oxide. The layer is subjected to hydrofluoric acid to selectively remove organosilanol of the unexposed portions relative to organosilicon oxide of the exposed portions. As indicated above, neither Weidman 1995 nor Weidman 1993 disclose or suggest exposing organosilanol to ultraviolet light. The cited references only

disclose exposing organosilanes to ultraviolet light. Further, page 11 of the Examiner's Action states that Weidman 1993, page 272 describes selectively removing organosilanol of unexposed portions with hydrofluoric acid relative to organosilicon oxide of exposed portions. Such assertion is erroneous since Weidman 1993 does not provide even a mention of hydrofluoric acid on the referenced page or elsewhere throughout the art. Weidman 1995, page 679, paragraph 2 describes "wet HF based development to give positive tone patterns," but such processing contradicts the method set forth in claim 22. Specifically, positive tone development comprises removing exposed portions of a pattern. In claim 22, hydrofluoric acid is used to selectively remove "unexposed portions" and thus comprises negative tone development. By contrast, Weidman 1995, page 679, paragraph 2 discloses chlorine plasma etching to give negative tone patterns. Accordingly, neither cited reference discloses or suggests exposing organosilanol to ultraviolet light. Also, neither reference discloses or suggests selectively removing organosilanol of unexposed portions relative to organosilicon oxide of exposed portions. A cited combination of art must disclose every element of a claim for obviousness to be established. Since both references lack disclosure of the described elements, it is inconceivable that a combination of the references could somehow disclose or suggest the method of claim 22. Thus, claim 22 is patentable over the cited art.

Claims 23 and 24 depend from claim 22 and are thus also patentable over the cited art at least for such reason as well as for the additional limitations set forth therein. For example, claim 24 specifies cutting the wafer into separated die after selective removal of organosilanol while organosilicon oxide remains over the wafer. None of the cited references described die cutting. Further, none of the cited references describe organosilicon oxide remaining over a substrate during wafer cutting after selective removal of organosilanol. Claims 23 and 24 are thus also patentable over the cited references. Applicants request allowance of claims 22-24 in the Examiner's next action.

Claims 30-33 are also patentable over the cited art for the additional limitations set forth therein. Claim 30 depends from claim 1 and sets forth the deposited layer of material comprising oxygen as deposited. Claim 31 depends from claim 1 specifies the material containing organosilanol as deposited. Claim 32 depends from claim 1 and specifies the material comprising silanol as deposited. As discussed above at least regarding claims 10, 14, and 15, the cited art does not disclosed or suggest depositing a layer of material comprising oxygen, organosilanol, or silanol, as deposited, as set forth in claim 30-32. Claim 33 depends from claim 25 and further specifies that forming a layer comprises depositing a layer of silanol as deposited. Similarly, the cited art does not disclose or suggest claim 33. At least for such

reasons, claims 30-33 are patentable over the cited art. Applicants request allowance of claims 30-33 in the Examiner's next action.

Claims 1-33 are allowable at least for the reasons discussed above. Applicants therefore request formal allowance of all pending claims in the next Examiner's Action.

Respectfully submitted,

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